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Printing and Transferring; Type and other Surfaces for Printing, Composing, and Distributing Type.—W. Morgan-Brown (com.), 2513. F. W. Haddan (com.), 2737.

Propelling Carriages. — R. W. Eddison (com.), 2431.

Propelling Machinery, Transmitting Power and Motion, Converting Movements. — E. Edwards, 2774.

Propelling Ships, Propellors, Paddle-wheels, and Screws.—M. P. W. Boulton, 2597.

Pulleys.—W. and S. Bottomley, 2681.

Pumps, Pumping and Raising Water and other Liquids, Pumps, Pistons, and Packing.—E. Paul, 2417. J. Beale, 2419. R. Heyworth, 2479. W. E. Newton (com.), 2483. J. Hall, 2563. J. Hampson and J. Kerr, 2620. E. and G. Ashworth, 2646. W. L. Wise (com.), 2665. C. Avery, 2667. V. C. J. Ortmans, 2716. W. Hart, 2755. W. Craig, 2757. W. Canham, 2766.

Punching and Perforating.—W. R. Lake (com.), 2497.

Railways, Permanent Way, Rail Joints, Chairs and Sleepers, Portable Railways, Atmospheric Railways, Switches, Points, Crossings, and Turntables.—J. L. Rosenfield, 2413. W. Milner (com.), 2422. H. Gardner (com.), 2426, P. Black, 2478. C. H. Denham, 2490. W. Black and J. G. Tatters, 2669.

Railways, Carriages, Coupling, Uncoupling, and Altering Position of Carriages and Engines.—M. J. Roberts, 2402. T. J. Smith (com.), 2515. H. Shephard, 2522.

Reaping, Mowing, Making Hay, Gathering in Produce.—E. Griffin, 2562. W. McI. Cranston (com.), 2582. W. R. Lake (com.), 2604. S. Corbett, 2625. H. J. H. King, 2638.

Refrigerating, Cooling Liquids, Making Ice.—J. Wright, 2486. A. Browne (com.), 2728.

Registering, Indicating, and Marking.—T Morgan (com.), 2412. W. R. Lake (com.), 2436. H. Pottin, 2510. E. Brasier, 2598. B. Templar, 2601.

Retorts and Crucibles, Melting Pots.—G. K. Stevenson, 2622.

Roadmaking and Paving, Cleaning Streets.—A. Wilks, 2739.

Rockets.—G. Quick, 2554.

Ropes, Cordage, Twine, Oakum, Wire Ropes.—J. Burn, 2656. W. Coppin, 2778.

Salt and Saltpetre.—T. Higgin, 2504.

Sewing and Embroidering. — W. E. Gedge (com.), 2482. H. Bland, 2503. W. Dawes, 2599. J. G. Grey, 2700. C. Bastand, 2765. W. H. Stephens, 2773.

Shears, Scissors, Clipping and Shearing Animals.—E. J. Henchy, 2427. W. M. G. Turquand, 2429. J. R. L'Amy, 2654.

Ship and Boatbuilding.—H. Fletcher, 2423. W. L. Wise (com.), 2407. H. Arentz, 2565. M. P. W. Boulton, 2597. R. E. Harris, 2642.

Shirts, Collars, Wristbands, Neckties, Scarfs, Drawers, &c.—H. Whitehead, 2570. S. Hayem, 2633.

Sifting, Sorting, Separating.—W. Houghton, 2640.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—J. Barton and J. Rogers, 2415. P. Black, 2478. J. Higham, 2588. W. R. Lake (com.), 2729.

Slag or Scoria (Treating and Utilizing).—W. Charlton, 2548.

Soap.—R. Dixon, 2655.

Spinning and Preparing for Spinning.—J. R. Dry and S. Anderson, 2408. J. and J. Horrocks and E. Whalley, 2439. B. A. Dobson, 2459. G. Brooke and J. Strake, 2529. P. Feather, 2529. J. Thompson, W. Barker, and H. Morton, 2705. A. V. Newton (com.), 2742. H. A. Foster, 2761. S. Bickerton, 2771.

Spray Producers.—W. R. Lake (com.), 2552.

Springs.—J. Barton and J. Rogers, 2415. A. C. Hempel, 2703.

Stamps and Stamping, Seals, Monograms, Labels, and Tickets; Damping, Cancelling, and Protecting Stamps and Labels.—F. Eade and J. W. Blake, 2505. E. Wardroper, 2590. T. Parker and G. A. Prince, 2672.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water-feeding Apparatus for Boilers.—W. H. Mirfin, 2405. J. Furness, 2411. W. R. Lake (com.), 2456. J. Hall, 2563. J. H. Walker, 2578. A. Cozza, 2580. P. J. L. Bolland, 2608. W. Hart, 2755. G. Hepburn, 2767. J. Smith, 2776.

Steam Engines (Stationary, Locomotive, and Marine.)—W. R. Lake (com.), 2434. J. Wright, 2486. W. W. Cryden (com.), 2576. E. and G. Ashworth, 2646. A. Vile, 2780.

Steering or Guiding Ships, Carriages, Ploughs, &c.—A. Steenberg (com.), 2730.

Stone and Slate, Artificial Stone and Marble, Grindstones and Millstones.—W. E. Newton (com.), 2525. G. Dalton, 2568. W. R. Lake (com.), 2577. A. Browne (com.), 2760.

Stuffing Boxes.—J. and F. J. Robinson, 2670.

Sugar and Syrups; Glucose.—A. McOnie, 2444.

Surgery, Surgical Instruments, Splints and Bandages, Trusses for Hernia, Artificial Limbs.—W. E. Gedge (com.), 2607.

Syringes.—W. Morgan-Brown (com.), 2674.

Telegraphs; Telegraph Printing Apparatus.—S. Pitt (com.), 2430. J. W. Brown, 2449. C. H. G. Risch, 2463. J. and A. Muirhead, 2538. L. Carlander, 2696.

Tents, Marquees, and Awnings.—W. Brierley, 2536. R. H. Hilliard, 2572.

Thermometers, Barometers, Pyrometers, Salimometers Electrometers; Testing Strength of Fluids.—F. Bogen, 2532. H. Gardner (com.), 2708.

Tobacco and Snuff, Cigars, Cigar-holders, Pipe and Cigar-lighters, Smoking-pipes, Tobacco-pouches.—E. R. Morris, 2535.

Tools.—J. Thompson, W. Barker, and H. Morton, 2705.

Torpedoes.—G. Quick, 2554.

Toys.—W. Morgan-Brown (com.), 2671.

Tramways and Tramway Carriages, Tramway Locomotives.—M. J. Roberts, 2402. J. Eades, 2404. R. W. Eddin (com.), 2431. W. W. Cryder (com.), 2576. G. F. Deacon, 2362.

Umbrellas, Parasols, &c.—F. Hodges and G. A. Healey, 2407. J. H. Johnson (com.), 2485. H. F. S. Brander, 2668.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—R. R. Gubbins and J. Whitestone, 2469. G. Henderson and D. McNeil, 2583. P. J. L. Bolland, 2608. W. Hanson, 2733. W. M. and J. Smeaton, 2743.

Velocipedes.—F. M. B. Bertram, 2518. J. Lang, 2569. J. Carver, 2616. E. C. F. Otto, 2748.

Ventilation; Supplying and Purifying Air for Buidings, Mines, Ships, Carriages, &c.—P. Jensen (com), 2446. R. Thomson, 2465. W. R. Lake (com.), 2729. J. Wilson, 2741.

Vices, Floor Dogs, or Cramps, Cramp Keys, Wrenches, Spanners, and Screw Keys.—C. Neil, 2673. W. Riley and H. Mullen, 2747.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—E. Taylor, 2400.

Watering, Supplying and Distributing Water, &c.—G. Henderson and D. McNeil, 2583. W. C. Taylor, 2587. A. G. Margetson, 2595. D. Mc Mechan, 2630. W. Rowles, 2675.

Waterwheels and Engines, &c.—F. W. Haddan (com.), 2644.

Wearing Apparel for Gentlemen, Military Outfits, &c.—R. Thomson, 2465. W. R. Lake (com.), 2472. J. E. Orrell, 2523.

Weaving, Braiding, Plaiting, Preparing for Weaving.—O. Ball, 2410. R. Kyle, 2464. F. J. Astbury, 2489. J. Collins, 2495. F. H. Z ffer, 2516. T. H. Brigg, 2549. J. Glover and W. Leggott, 2581. J. I. Tinkler, 2637. H. B. Barlow (com.), 2658. J. Holding and J. Crossley, 2718. H. B. Barlow (com), 2723.

Weighing Machines, Scales, Indicating Weight.—A. Cozza, 2168. G. W. von Nawrocki (com.), 2657.

Wheels for Carriages, &c.—C. Bell, 2463. J. Bowron (com.), 2769.

Wheels for Machinery.—J. G. Grey, 2700. J. Bowron (com.), 2769.

Winding, Reeling, and Balling Yarn and Thread.—J. and J. Horrocks and E. Whalley, 2439.

Window Blinds, &c.—A. C. Herts, 2713. H. Hughes, 2727.

Windows and Sashes, &c.—F. W. Helliwell, 2452. G. S. Saunders, 2484. W. and W. J. Greene, 2613. W. R. Lake (com.), 2683. J. W. Morgan and C. Bassett, 2712.

Wire-Working, Wire Ropes, Telegraph Cables.—H. Evans, 2690.

Yeast.—J. A. Liebert (com.), 2726.

⁂ *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

AMERICAN INVENTIONS FOR NEW SOUTH WALES.

Writing from Sydney, under date of April 14th, the *Times* correspondent thus refers to the supply of locomotives and carriages from America: Our appearance at Philadelphia has drawn the attention of American manufacturers to us in a most marked and unexpected degree. A country that, like New South Wales, is rolling in wealth, must be a country that is able to buy, and a country that is able to buy is exactly the country that American manufacturers have been anxiously looking out for. Our representatives at Philadelphia have come back strongly impressed with the fact that there are many things that the Americans can supply us with advantage. Our Government has an offer from Messrs. Baldwin and Co. to furnish a locomotive engine for about £1,000 less than the cost of an English engine, and to leave the payment open until the engine has been thoroughly proved and approved. A Pullman's sleeping car and an ordinary passenger car have already been ordered, and American wheels, axles, rails, and brakes are strongly pressed on our acceptance. As our Government engineers are all of the English school, American novelties will have a hard battle to fight to win official acceptance, but the demand for economy in railway construction and working is so great that people and Parliament will press on the Minister for Public Works a fair trial for any American novelties that may seem to be suited to our wants. The English manufacturers, therefore, who have hitherto supplied us must look to their laurels.—*Capital and Labour.*

Improved Loom Temple.—Christian H. Schlaf, of Rockville, Conn., has invented a device for stretching the cloth while being woven. It is so constructed as to adjust itself as the cloth is being woven and carried forward to the cloth beam.

Reviews.

THE SEAT OF WAR.

"Passages of the Danube and Passes of the Balkans, showing the approaches to Constantinople." McClure and McDonald, lithographers to the Queen, Queen Victoria-street.

Messrs. McClure and McDonald have just issued a very handsome map or plan as above—large—on stiff paper; and being very handsome it is a wonderful half-a-crown's worth. We would be sorry to accord praise where it was not due, therefore our readers will be safe in assisting their studies of current events by the map. We are a little reminded in looking at it of the plans which were so generally framed years ago of Odessa, Cronstadt, &c.; but the course of time has brought a great improvement in mapping, as in other things, and the above firm's publication is far better worth framing.

SIXPENNY MANUALS OF INSTRUCTION.

Physical Geography; Natural Philosophy; Magnetism and Electricity; Latin.

These publications are sold at the Central School Depôt, 22, Paternoster Row, and are edited by Mr. J. Stuart Laurie. They are neatly got up, and partly illustrated. The Natural Philosophy volume contains some good accounts of pneumatics and similar subjects, the force pump and the fire engine, being like many other practical subjects, described in a popular way, which will be intelligible to the young, and we believe they would be likely to be easily learnt by heart. We would be inclined to say that these works are suited to the period; that a great deal of information is placed in an intelligible way, the different articles being in larger type at the commencement of the line. In Physical Geography the first part comprehends figure of the earth, distribution of sea and land, and form of Continents, mountain system, divisions of oceans, ocean currents, atmospheric phenomena, trade winds, distribution of plants and animals, races of men.

Speaking of engineering, the author says, the influence of man's skill may be seen in the completion of such works as the Thames Embankment and canals like Suez and Panama. The number before us is very interesting, containing information as to ocean floors, drifts, surface waters moving with the wind, uses of lakes, food, and useful plants.

"DESIGN AND WORK."

We have recently received Vol. II. of this praiseworthy serial, which for an expenditure of one penny per week places at the command of everyone a vast amount of general information on practical science and art, presented in a manner so popular and pleasing, that there is no need of any special technical learning to enable the reader to obtain from its perusal pleasure and profit. It is peculiarly the kind of work to prove of advantage to thoughtful artizans and practicians in industrial matters.

NEW MUSIC.

Amongst the best musical *morceaux* are some recent productions published by Duff and Stewart, of Oxford-street, a piece, "Summer Night," being a beautiful serenade by the eminent composer Henry Log , whose merits are widely recognised. The music is very good. The other two are songs, one dedicated to Sir Charles J. Palmer, Bart., "The Victorine" song, the verses by a Yachtsman, the music being extremely spirited. It is not the lay of a fur "comfortable" but of a gallant yacht, the *Victorine*, and there is a great deal of it. "Of all the ships afloat, boys, give me the *Victorine*," will be a favourite. The third is pathetic, *andantino pathetico*, "Loved and Lost," words by Percy Fitzgerald, and music by Otto Müller.

POCKILOGRAPHIC OIL PAINTINGS.

Some of these paintings have been received at the large studio of Messrs. Lombardi, 13, Pall Mall, E., for exhibition and sale. They are executed by a new process named as above, and comprise masterpieces by old masters in the Dresden Gallery which have been reproduced in a way which *appears* at any rate to resemble the original very extraordinarily. It is not only that the dark colouring resulting partly from age is reproduced, but the faces, drapery, and general merits as reproductions deserve attention and a meed of praise. We would recommend our readers who take an interest in art whether in ancient or modern form to pay a visit to this gallery and judge for themselves. They will find the price of the paintings is very cheap £5 5s. for half ones and £10 10s. for entires. We may cite as exemplars worthy of their inspection—the quaint faces of an old man and woman (Flemish), two half paintings which would be exceedingly suitable for a private library or study; the Madonna of San Siste, by Raphael, and a companion picture "Angels" part of same, and the stoppage of Hagar by Van der Werff; also the Madonna de la Catina, by G. Romano.

These, as stated, are some of the *first* specimens of copies from the old masters in the Dresden galleries; and it is stated that the process of reproduction—a combination of chemistry and artistic skill—is quite a recent discovery, and is supposed to bring out all the appearance and characteristics of the originals. A number of other specimens will arrive in a few days' time. As it is quite within the scope of this journal to point out progress or novelty in art, we have pleasure in calling attention to pockilographic painting. It appears that the proprietors of the studio are soon to be in a position to take photographs from life by the same process with the results of an oil painting comparing favourably with those taken from life by eminent artists.

ROMAN'S NEW MATCH BOX.

Among the practically useful inventions recently completed we have to notice a very ingenious contrivance of a portable receptacle patented by Mr. H. Roman, of Piccadilly.

As the annexed illustrations will show, it really seems impossible to obtain with greater simplicity so many essential results as effected in this box.

The box is formed primarily of four portions or parts, viz., the outer case, the inner case, the lid, and the spring. The inner box and spring may, however, be preferably of one piece; such box may be made of metal, wood, or other suitable material. The outer case is made out of one or two pieces of metal, open at one end and closed at the other. On one side of the said outer case an opening is left (which is towards the centre). The lid is fixed to one of the sides at the upper part of the outer case.

The above-mentioned outer case is provided with an inner receptacle, which is shorter than the outer case, having a fixed bottom. The inner case is of such length that when the box is closed it fills up the opening in the said outer case. In the side of the inner case, which fills up the opening in the outer case, is a catch, cut or pressed out in the side of the inner case, said catch being so formed that when in position and the box closed the catch comes against the edge or side of the opening in the outer case and thus prevents the box opening. To one of the sides or to the bottom of the inner case is attached a spring or arm, which is fixed or connected or in one piece with the side so as to effectuate the opening of the same.

The action of the box is as follows:—When the finger or thumb is placed on the side of the inner case, projecting through the opening of the outer case above-mentioned, and an attempt to push up the inner case is made, the slight pressure exercised releases the catch, and then the inner case slides or rises up to the top of the outer case, and simultaneously the spring attached to the side of the inner case presses against the lid to which it is attached, and by passing through a loop formed in the lid or otherwise causes it to open, while the articles contained in the inner case are lifted up above the top of the outer case, and the user can readily withdraw the same.

The closing of the box is effectuated simply by drawing down by the thumb or finger the inner case till the catch assumes its former position against the side of the opening in the outer case. By the same action the spring attached to the side of the inner case and the lid draws down the lid and thus closes the box.

FIG. 1.

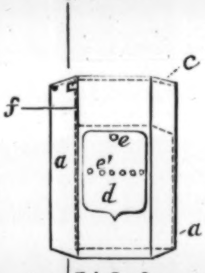


FIG. 2.

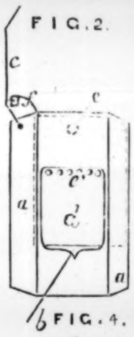


FIG. 3.

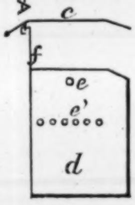


FIG. 4.

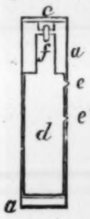


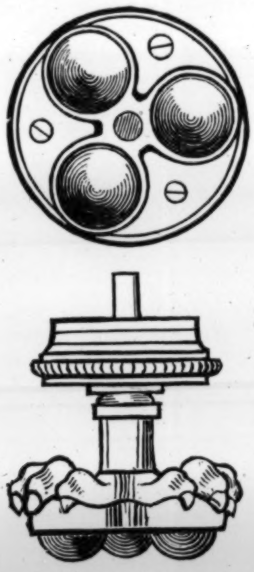
Fig. 1 represents an elevation of the new or improved receptacle closed; Fig. 2, elevation, open; Fig. 3, elevation of inner case showing the spring forming part of the sai case in position with the lid; Fig. 4, sectional view of the receptacle on line A, B Fig. 1.

In these figures *a* is the outer case, formed preferably of one piece of metal, same being furnished with the opening *b* left on one side of said case *a*. This case *a* is at the bottom closed, and open at the top; *c* is the lid fixed (free to move) in the upper part of case *a*, as shown; *d* is the inner case or receptacle, which is shorter than the outer case *a*, as shown in fig 4, and has a fixed bottom. The length of this case *d* however is such as to fill up the opening *b* of the outer case *a*, *e* is the catch cut or pressed out of the inner case *d*, and rests when the receptacle is closed against the edge of the opening *b* in the outer case, as shown in fig. 1, and thus prevents the box opening; *f* is the spring forming part of one of the sides of the inner case *d*, and this spring *f* is hinged or attached to the lid *c* by loop or otherwise.

The action is as follows:—The finger or thumb is pressed on the portion of the inner case *d*, shown through opening *b*. The attempt to push up the inner case *d* being made frees the catch *e* from contact with the outer case *a*, and the said inner case *d* slides or rises up to the top of the outer case *a*, and at the same time the spring *f* pressing against the lid *c* causes it to open, and the matches or other articles in the inner case *d* are brought up above the top of the outer case *a*, and are readily taken out by the user of the box. The closing of the receptacle is accomplished by simply drawing down the inner case *d* till the catch *e* assumes its position against the opening *b* in the outer case *a*. The limit of rise of the inner case is governed by pressing or forming on the inner case a suitable projection e^1.

ASHENHURST'S GLOBULOUS CENTRE-ACTION CASTORS.

VARIOUS attempts have been made to construct a castor for pianofortes and furniture, which shall not be liable to the objections of the ordinary article—namely, weakness and resistance to the movement of the piano or piece of furniture direct in the line of motion desired. Some of these attempts were at first considered as likely to effect the desired object, but further experience showed that they were practically defective, and so, although it is now many years since they were submitted to the public, nothing has superseded the old-fashioned castor which is still used, though continually railed at. Mr. Ashenhurst's improvements in castors comprise greater strength and durability, and the power of moving the pianoforte or furniture direct in the line of motion required, and not an angle, that is, avoiding deviation from the central line.



As shewn in the accompanying illustrations two castings are made to fit one to the other, and are secured by screws or other means. In these castings are sockets provided for two or more spherical balls or globes (three having the preference), the same being placed in a position so as to protrude not more than one-third of their spherical surface beyond the two castings (which are underlaid with india rubber) and secured together. A screw or central pin which is secured to the screwplate of the upper part (where is a socket to receive the leg of the pianoforte or furniture) giving an uncontrolled revolution in any direction from the starting point, and avoiding the disagreeable squeaking noise, and the tearing and drilling holes in parlour and drawing room carpets, which is so common with the castors in present use. The castors can be seen and prices obtained on application to the inventor and patentee, at the patentee's address, 5:, Cardington-street, Hampstead-road, N.W.

FOREIGN SCIENCE.

IN France the practical application of the electric-light is greatly striven for. In the large gallery of the Palais de l'Industrie, a system of lighting *a giorno* is installed by two electrical lustres composed of six regulators; the magneto-electrical machines for this lighting are of fifty horse-power. The results have been satisfactory without actually establishing that the Gramme machine is superior to that of the Alliance and the system of electrical bougies of Jablochkoff and Denayrouze. The Paris and Lyons railway have just adopted it at Paris. Invention is displaying itself in all sorts of departments at present, affording an example which we Britishers should not be slow to follow. It appears "amongst *the* very latest" discoveries that a M. Fremaux, of Martinique, has invented a machine for manufacture of sugar which makes a difference when applied to turbines of 5 per cent. greater sugar weight. His agents in Paris, M.M. Dartheze and Bellize, have taken the apparatus to a great number of manufacturers, and all over France it has been a success, says our acquaintance *Cosmos*, edited by L'Abbé Moigno.

The Academy has elected a correspondent for the botanical section in place of the late M. Lestiboudois, M. Goudron having obtained 33 votes (against 5 given to M. Jouve) has been proclaimed elected. In reference to a kindred branch, phylloxera as usual engages a deal of attention. A vine planted in clayey calcareous land is exempt from the reigning malady or resists it well. When the surface of the land which it occupies inclines sufficiently, beginning from the bottom, the stump is at the same time preserved from the contact of the rainy water coming from higher bottoms, whether by exhaustion of the soil or by means of any flood passage whatever.

A. M. E. Amagat has been engaged in researches into the compressibility of volatile liquids, by maintaining liquid by pressure to a temperature superior to that of the points of ebullition—a condition in which it is known the co-efficient or dilation of these bodies becomes very considerable. He has operated to the temperature of 100 degrees and to some intermediate temperature.

The co-operation for the purpose of receiving and exchanging meteorological observations sprang from a conference at Vienna in 1873, which has been established between the United States and following countries—namely, Algeria, Austria, Belgium, Great Britain, Denmark, France, Germany, Italy, the Low Countries, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, Greece. Canada, Hawaii, Dutch Guiana, and Japan. The American Government receives congratulations for instituting a special service for warnings, and telegraphic information for the good of commerce and agriculture. Thanks to the care bestowed on agriculture and maritime warnings, cultivators and merchants daily avoid losses, and the service rendered is so appreciated that the numerous public to which its provisions are addressed consider them as infallible prognostics. It is proper to say, in fact, that the result proves them almost always right. *Cosmos* says: "It may be seen with what solicitude dynamic meteorology has been studied and organised in the United States. It is to be wished that this example should be followed with the same ardour by all civilised nations, and that at least they would associate their efforts to those in which American meteorologists give so shining a testimony. We can, whether *Cosmos* be oracular or not, add a similar recommendation in regard to this country. Some good results would be secured by studying the statistics and phenomena to be obtained over a term of years. The French and Austrians are rather forward in such matters. In astronomy discussion has been going on about Hyperion, a satellite of Saturn. In taking 8° 86′, for the solar parallax, Professor Hull would give for the mean distance of Hyperion, setting out from centre of Saturn, 914,000 miles; distance peri Saturn 1,800,000 miles; apo Saturn, 11,928,000.

The astronomers connected with Belgian Academy of Sciences have been quarrelling. M. Terby attacks another astronomer because he observed some resemblance at a particular hour between the aspect of Mars and the habitual aspect of Jupiter. M. Terby declares that with the assistance of calculation he finds that at that hour a permanent well-known spot crosses the disc. To him the annoyed *savant* replies—"Well, what does that prove? That I have observed Mars precisely at a certain hour, that I have not calculated retrospectively, and that I have not sought whether the effect was produced by a permanent spot or by clouds. He insinuates besides that if I have only caused a drawing of Mars to be engraved, it is a proof that I have not made other drawings of that planet." But enough time has been lost. The real truth is that M. Terby is simply jealous of what other astronomers have been occupying themselves with about Mars.

M. Maumené recently showed the Academy a new gas hydrometer, affording a rapid appreciation of the volume of gases as well as their industrial analysis. The instrument is composed of a flask producing the gas to be measured, a cylinder containing an india-rubber pocket communicating with the flask by a tube, by which the water displaced by the gas floods to get into the graduated part measuring the quantity of liquid.

PATENT-OFFICE.

THE Commissioners of Patents have determined to continue their publication of official abridgments from the year 1866 onwards. Most of the series referring to different classes of inventions have now been brought down to that date, and it was originally intended that the work should stop here, the place of these abridgments being taken by the abstracts which, since 1866, the applicants for Letters Patent have been required to send in. As it was found that these abstracts were of little real use, they were stopped about a year ago. The new issue of classified abridgments will contain the inventions of the last ten years, 1867 to 1876 inclusive. Several volumes are already in preparation, but it will be some time before any of them can be published.

AUGUST 9TH, 1859.

A moss-grown wall, and an impassioned face,
Soft blue eyes looking down;—a manly grace
Stooping with smile and voice to gain
A love, till then a hidden pain!
  Are memories of long-ago:
  Of home, which makes me prize you so.

Away, away, remembrance free!
The wall has fallen; and for me,
The voice and face come not again,
Although I dream with yearning pain
  Of the lost home of long-ago,
  When first I knew one loved me so.

V. GONVILLE D.

CHRIST'S HOSPITAL SCHOOL.—Our regard for all that affects public education has made us watch with much interest the various statements made as to the discipline of this famous school, which has become an important public question in consequence of the lamentable suicide of one of its pupils (Gibbs). A friend of ours affirms that this institution is perhaps the most humane and the least culpable as regards discipline of all our important public schools. There has been no "fagging," no caning by prefects, no tunding, nor any other of those abominations in which other similar institutions glory, practised at the Bluecoat School, and if any petty persecutions or brutalities have occurred, they have not been sanctioned by the disciplinary system pursued, but have been in violation of it.

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SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President, SIR ANTONIO BRADY.

The Session 1876-77 is now ended. Notices of Executive Council Meetings will be given by post.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.
F. W. CAMPIN, Sec.

N.B.—The movement for the REDUCTION OF PATENT STAMP DUTIES *is still on foot; those who wish to support it should at once communicate with the Secretary.*

Proceedings of the Institute.

EXECUTIVE COUNCIL.

ON the 19th July an Executive Council was held, Mr. F. H. Varley, Chairman of the Executive Council, in the absence of the President or a Vice-President, presiding. After transacting the requisite financial business, the position of the Patent Law Bill was discussed, and it was decided that nothing further could at present be done.

EXTRA MEMBERS' MEETING.

There was an extra Members' Meeting for the further consideration of Mr. Pritchett's invention for "Indicating Correct Time by Concurrent Action from one Standard Clock," but for the present we must reserve our report.

REVIEWS POSTPONED.—Several reviews have to be postponed, amongst them "The Telegraph Guide," published by Messrs. Cassell and Co.

Monthly Notices.

The Defects of Vision which are remediable by optical appliances, treated of in the Hunterian lectures for 1877, delivered at the Royal College of Surgeons by Prof. Brudenell Carter, which contain an explanation of the metrical system of lenses, and of their use in estimating errors in the refraction of the eye, will shortly receive the publicity they deserve, Messrs. Macmillan and Co. having announced them as for publication in October.

The Depth of the Ocean temperature and currents form the subject of a volume by Mr. John J. Wild, of the civilian scientific staff of the *Challenger* expedition. The work is entitled "Thalassa," shortly to be published by Messrs. Marcus Ward and Co.

The Diamond Boring Company having placed three of their machines in one of the lower levels of Carn Brea copper and tin mine, near Redruth, are now enabled to announce the complete success of the first trials. These trials and the success of the Barrow Borer at Dalcoath mine promise to reduce the cost of deep mining considerably, and thus greatly to benefit an important industry, which is now in a state of extreme depression.

The *Inflexible*, which was the subject of our principal article last month, is still a *cheval de bataille.* Mr. Reed and Mr. Barnaby are fighting out the question, which seems, as we intimated, to be one of *practical* construction rather than of system or theory. In these matters it is not too much to say that a well-built, sound vessel on a defective plan is far superior to an ill-built one constructed according to the most correct plan that can be devised.

Love's Patent Draining and Peat-Cutting Machines.—We are glad to learn that Mr. Love is at work with this machine at Chat Moss. He informs us that his machine is applicable to the drainage of all land free from stones, especially bog or moss. Owing to the softness of all these soils he finds that the steam tackle of Fisker and Co., of Leeds, is more susceptable of arrangement to meet the difficulties arising from the softness of mosses, which required the engine to be placed frequently at a great distance from the machine, the different parts of this tackle being so much lighter than any other, renders it peculiarly adapted for all soft soils. We shall probably return to this subject at an early opportunity.

The University of Manchester.—The efforts being made by those interested in affording to the residents of the Manchester district increased inducements to systematic study by securing for the Owen's College a Royal Charter conferring upon it the rank and privileges of a university were fully referred to some few months since, and it is gratifying to find that the movement seems to be making highly satisfactory progress, and appears to be not unfavourably regarded by the Government. The memorial which asks "that a Royal Charter may be conferred upon the Owen's College, Manchester, constituting it the University of Manchester, with power to grant degrees in arts, science, medicines, and law," was presented to the Lord President of the Council (the Duke of Richmond and Gordon) on Saturday by an influential deputation introduced by Sir T. Bazley, Bart., M.P., who was accompanied by Mr. H. Birley, M.P., and Mr. Hibbert, M.P. The Principal of the College (J. G. Greenwood, LL.D.) and his colleagues were exceedingly well supported, Lord Aberdare, the Bishop of Manchester, the Rev. Mark Pattison, Dean of Manchester, and Lord Frederick Cavendish being amongst those present, and the Duke of Devonshire, although unavoidably absent, sent a letter, in which he said that he would have been prepared to state that he does not think the requirements of the higher education in the important district of which Manchester is the centre are sufficiently provided for by the existing universities, and that in his opinion a strong case has been made out in favour of the proposal for establishing a University of Manchester in the memorial about to be presented to the Privy Council, which memorial, therefore, appears to his Grace to deserve the serious consideration of her Majesty's Government. That the entire district is desirous of the granting of the charter is apparent from the fact of memorials in support of the project having been tendered from the Corporation of Manchester, Salford, Clitheroe, Burnley, Rochdale, Warrington, Southport, Stockport, Oldham, Bury, Bolton, and Blackburn. The reply of the Duke of Richmond and Gordon was most encouraging, and fully justified Sir Thomas Bazley in remarking that the deputation left their case in his Grace's hands, believing that they would receive ample justice.—***Mining Journal.***

THE SCIENTIFIC REVIEW
AND
Scientific and Literary Review.
A RECORD OF PROGRESS IN
ARTS, INDUSTRY, AND MANUFACTURES.
INCORPORATING THE
JOURNAL OF THE INVENTORS' INSTITUTE.

AUGUST 1, 1877.

PUBLIC LIGHTING BY ELECTRICITY.

Electricity is truly a wonder-working power. We can even now almost say that with its help we can "waft a sigh from Indus to the Pole"—and it would seem that very shortly by its aid the music of the Pall Mall Opera House will be sent out to delight our friends at the Antipodes, and orators at home be listened to by audiences assembled at remote places abroad.

That electricity will at no very distant day illuminate our roads and streets has long been a matter of confident hope, and many ingenious men have for years past been busy with plans and devices for superseding gas and other means of lighting by electrical apparatus, but from one cause and another nothing which has been found to be practically reliable has resulted from the inventive genius exercised upon the subject.

Recently our hopes of accomplishing the great feat of illumination by lightning power have been made to rise to the full height of expectant belief by the successful experiments of M. Paul Jablochkoff at the West India Docks, Limehouse; and up to the present time nothing has occurred to diminish confidence in a successful issue being at length attained; this feeling being supported by the fact that already electric light apparatus of dazzling splendour has been erected on the Foreland and Lizard Cliffs, attracting the notice of vessels approaching the English Channel from the ocean, or, as the case may be, crossing from Calais to Dover; further, the inventions and experiments of M. Gramme and Dr. C. W. Siemens have not been unsuccessful, as to which notices fail not to appear in our Foreign Science and other columns. M. Jablochkoff has (according to the account which appeared in the *Daily Telegraph*) succeeded in so distributing an electric current as to produce an indefinite number of lights within a single circuit. He has thus made provision for supplying lights of great power suitable for the illumination of halls or warehouses, and also, from the same electrical source, producing a number of lights of less intensity for the use of offices and corridors. In this way the magneto-electric machine would correspond to the gasometer, the wires to the gaspipes, and the kaolin band inserted between the perpendicular and parallel carbon points to gas-burners. Several lights of strong effulgence required to illuminate an extensive area may be simultaneously kindled by transmitting to the carbon points the electric stream from a battery; and, if a score of smaller lights were needed for as many different apartments in the same building they may be ignited or extinguished by simply connecting or disconnecting the wires. A single electric flame, according to the principle of M. Jablochkoff, furnishes light equal to that of a hundred gas-burners, with this important difference, however, that the vastly augmented illuminating power of electricity is not attended with any increase of temperature. A soft, transcendently white, and uniformly steady light is obtained, instead of the yellow and flickering jet to which consumers of gas for the most part are accustomed, while salubrious ozone is developed in process of combustion, instead of the unwholesome vapours with which the atmosphere is to a certain extent invariably poisoned by the product of ordinary gas coal. The kaolin—which is a species of hard clay employed in porcelain manufacture—being a non-conductor, is placed between the two upright sticks of carbon. When the electric current is conveyed by means of wires to the carbon points the kaolin becomes fused by heat, and gives out the brilliant light already described. The electric "candles" are constructed at present in such a manner that they will only burn one hour, and an appliance is contrived for quickly replacing them by hand before they become exhausted. Ere the invention can be pronounced complete, therefore, some automatic device must be planned in order to meet that deficiency. In a large tent covering one of the squares of the West India Docks four common lamp-posts were erected at the corners respectively. One of these was surmounted by an opal glass globe, which contained an electric light. The electricity used was generated by steam power in a magneto-electric machine of thirty-two magnets, each magnet being composed of six plates. The steam-engine, which was worked up to two and a half horse-power, effected four hundred and eighty revolutions of the magneto-electric machine per minute, by which is represented the application of considerable electric force. The smallest print could be read at a distance of from twenty to thirty feet from the lamp. The electric lights were then extinguished, and four lamps, each containing four gas jets of considerable size, were lighted. The contrast presented when these sixteen gas flames were introduced was, as might be expected, singularly dismal. The spectators next passed into a warehouse to observe the effect of the light upon an interior space. The electric candles were placed outside the windows and protected by a tin case, which operated as a reflector, and small type could be read with the utmost ease at seventy-five feet from the lamp. Except where sharply defined shadows of interposing rafters and pillars happened to be projected, every nook and corner in the warehouse was strongly penetrated with light. Great interest was added to the experiment by an incident which proved that the use of the new light is quite compatible with the discrimination of colours. A card of drapery patterns of various tints was exhibited, and when exposed to the electric rays, "green, blue, yellow, red, purple, and even the most delicate straw colour, were as clearly distinguishable as in daylight." The importance of this circumstance to artists, whose labours have always been regarded as conterminous with sunlight, cannot be overestimated.

The last of the experiments at Limehouse was intended to illustrate the possibility of loading or discharging ships after sundown without inconvenience. One electric light enclosed in a street lamp was placed on the wharf, and another light of the same description in a hand-lamp was carried freely about in different parts of the vessel, a sufficient quantity of insulated wire being allowed for that purpose. The portable light we have mentioned was conveyed from stem to stern without even a momentary flicker, and wherever it was placed it shone effulgently on every object for yards in all directions. The light on the wharf was so potent and so widely extended that the labour of dock hands might be carried on through the night without difficulty or danger. The utility of such a movable electric light for signalling between vessels at sea is obvious, and the extent to which fatal collisions might be avoided by this arrangement is incalculable. The attention of Trinity House will doubtless, by and by, be directed to the adaptation of electricity to existing lighthouses along the entire coast-line of the United Kingdom. With a slight modification it might be utilised in our streets, halls, and churches. Not the least recommendation of M. Jablochkoff's invention is that, while raising immensely the illuminating power, the cost of its production on a large scale will fall lightly upon consumers as compared with gas. Indeed, it is said that, in view of the probable changes which may result from recent experiments, the municipal authorities of a certain town in the West of England have refused to renew their contracts with the local gas companies for any protracted period. We should be sorry to think that gas, useful as it has been in ministering to the convenience of civilised nations in the past, is to be regarded as the final lighting agent which is possible to the world. It is more or less injurious to health, and under any circumstances tends to spoil books, pictures, and ornaments. It imperils property and life, by reason of the explosions to which those who consume it are exposed. If it can be superseded with advantage by electricity, the use of which would be unattended by liability to any of these contingencies, the latter will be heartily welcomed as a substitute so soon as it can be completely adapted by science to public wants.

Proceedings of Societies.

ROYAL SOCIETY.

JUNE 21ST.—Sir J. Hooker, President, in the chair. Notice was given that the statute under which the life composition in lieu of annual payments to the Society was reduced to £40 had been repealed. Lord Coleridge and Dr. T. R. Faser were admitted into the Society. The following papers were read: "On the Normal Paraffins, Part 2," by Prof. Schorlemmer,—"On the Relationship of the Nerve Cells of the Cortex to the Lymphatic System of the Brain," by Mr. B. Lewis,—"Notes on Physical Geology, No. 3, On the Probable Age of the Continent of Asia and Europe, and on the Absolute Measure of Geological Time," by the Rev. Dr. Haughton,—"On the thickness of Soap Films," by Prof. Reinold and Prof. Rucker,—"On some hitherto undescribed Peculiarities of, Doubly-refracting Crystals," by Mr. H. C. Sorby,—"On the Foci of Lines seen through a Crystalline Plate," by Prof. Stokes,—"Experimental Demonstration of the Origin of the Windings of Rivers in Alluvial Plains, and to the Mode of Flow of Water round Bends in Pipes," by Prof. J. Thomson,—"On Dr. Burdon Sanderson's latest Views of Ferments and Germs," by Dr. Tyndall,—"An Attempt to form double Salts of Silver Nitrate, and Nitrates of the Alkaline Metals," by Dr. Russell and Prof. Maskelyne,—"On certain Definite Integrals," by Mr. W. H. L. Russell,—and "The Physiology of Sugar in Relation to the Blood, Part 2," by Dr. Parry.

ROYAL INSTITUTION.

JULY 2ND.—G. Busk, Esq., Treasurer and V.P., in the chair.—Mr. W. D. Boger and Dr. H. A. Bruce were elected Members.

GEOGRAPHICAL SOCIETY.

JUNE 25TH.—Sir R. Alcock, President, in the chair.—The following gentlemen were elected Fellows: Marchese Bianchi, Messrs. D. Currie, R. Currie, C. Gardiner, G. E. Grover, J. Prince, J. A. Ridgway, and W. H. Tietkens.—The lecture read was, "On the Comparative Antiquity of Continents, as indicated by the Distribution of Living and Extinct Animals," by Mr. A. R. Wallace.

STATISTICAL SOCIETY.

JUNE 26TH.—Anniversary Meeting.—J. Heywood, Esq., President, in the chair.—The report submitted to the meeting shows the general progress and financial condition of the society to be highly satisfactory. The number of Fellows was 611 on the 31st of December, 1876, since which period eighty new Fellows have been elected. The Howard Medal for the present year will be awarded in November next. The subject of the essay for the Howard Medal of 1878 is:—"The Effects of Health and Disease on Military and Naval Operations." It has been decided to grant a sum of £20 to the writer who gains the medal. The following were elected as the President, Council, and Officers for the ensuing year:—President, G. Shaw-Lefevre; Council, E. W. Brabrook, Right Hon. Lord Borthwick, S. Bourne, H. Chubb, Hyde Clarke, J. Cleghorn, J. Danvers, Right Hon. Earl Fortescue, F. Galton, R. Giffen, A. Hamilton, J. T. Hammick, F. Hendriks, H. Jeula, Prof. W. S. Jevons, F. Jourdan, H. R. Lack, Prof. Leone Levi, W. G. Lumley, R. B. Martin, Dr. F. J. Mouat, R. H. Patterson, F. Purdy, E. G. Ravenstein, Sir R. W. Rawson, E. Seyd, T. Sopwith, W. Tayler, C. Walford, and T. A. Welton; Treasurer, R. B. Martin; Secretaries, H. Chubb, R. Giffen, and Prof. W. S. Jevons; Foreign Secretary, Dr. F. J. Mouat.

ZOOLOGICAL SOCIETY.

JUNE 19TH.—E. W. H. Holdsworth, Esq., V.P., in the chair.—The Secretary read a report on the additions to the Society's Menagerie during May, 1877, and called particular attention to a Pangolin (*Manis tricuspis*), purchased May 24th, being, so far as was known, the first example of this remarkable form of Edentata that had ever reached the country alive; a male of the new Mesopotamian Fallow Deer, lately described and figured by Sir V. Brooke in the Society's *Proceedings* as *Cervus Mesopotamicus*; and an animal purchased on the 29th May as a Cheetah, but which appeared to belong to a new species of the genus Felis distinct from, although closely allied to, that animal. For this the temporary designation of *Felis lanea*, or Woolly Cheetah, was proposed. The Secretary read a letter addressed to him by Mr. J. M. Cornély, announcing that his female *Hydropetes inermis* had just produced three young ones. Mr. J. Murray made remarks on a series of sharks' teeth, whales' ear-bones, and other specimens dredged up at great depths during the *Challenger* Expedition. Communications and letters were read: by Mr. P. L. Sclater, the first of a series of Reports on the Collection of Birds made during the Voyage of H.M.S. *Challenger*,—from the Marquis of Tweeddale, "On the Collection of Birds made during the Voyage of H.M.S. *Challenger* in the Philippine Islands:" amongst them were examples of seven species new to science,—by Mr. P. L. Sclater, "On the Birds collected at the Admiralty Islands during the visit of the *Challenger* Expedition to that place:" amongst these were examples of six species hitherto unknown to naturalists,—from the Rev. O. P. Cambridge, "On some New Species of Araneidea, with Characters of Two New Genera, and some remarks on the Families Podopthalmides and Dinopides,"—by Mr. J. H. Gurney, "On the Breeding of the Polish Swan in Captivity, and on the Stages of Plumage of the Young Birds,—from Mr. F. Moore, "On the Lepidopterous Fauna of the Andaman and Nicobar Islands, so far as is yet known,"—from Mr. H. Druce, a revision of the lepidopterous genus Paphia, with descriptions of twenty-one new species,—from Mr. E. J. Miers, "On a Collection of Crustacea (Decapoda and Isopoda), chiefly from South America, with descriptions of New Genera and Species,"—by Mr. A. H. Garrod, "On the Brain of the Sumatran Rhinoceros (*Ceratorhinus Sumatrensis*),—and by Mr. A. D. Bartlett, on a new Guinea Fowl, from Mombassa, in Eastern Africa, based on a specimen brought home by Mr. G. Waller, for which the name *Numida Ellioti* was proposed.

PHYSICAL SOCIETY.

JUNE 23RD.—Prof. G. C. Foster, President, in the chair.—Prof. W. G. Adams exhibited a complete form of optical bench, which, in addition to being provided with all the improvements introduced by Prof. Clifton, carries an arm which can be set at any angle to it, and is provided with appliances for studying a beam of light or radiant heat when it deviates from the main axis of the instrument. At the base of a pillar, firmly clamped in any position, is fixed a horizontal graduated circle, and a vernier, attached to a counterpoised arm, which rotates round the axis of this pillar, renders it possible to determine the angle made by the arm with the bench to one minute. At the upper extremity of the pillar is a steel pivot, to which various appendages may be clamped, and immediately below this is a second graduated circle, by which to determine the angular position of whatever is supported by the pillar. Mr. F. D. Brown exhibited an apparatus he has arranged in which to compare thermometers. Dr. Duthrie and Mr. Akroyd communicated a paper, "On Electrical Selection." When a metal or other body is rubbed against some non-conducting substance, like caoutchouc, electricity is developed and the track of the metal may be readily made evident by sprinkling on the caoutchouc a mixture of red-lead and sulphur. This sieving imparts negative electricity to the sulphur, and positive to the red-lead, hence that particular ingredient of the mixture is drawn to the metal track, which possesses the opposite kind of electricity. Iron, for example, when rubbed against caoutchouc, generates negative electricity, and, after sprinkling the powder, the iron track is revealed by the marked collection thereon of red-lead. A list of mixtures was given which may be used instead of the above, and it was shown that electrical selection may prove of use (1) in making an electrical diagnosis of the metals, (2) in certain experiments where the quadrant electro-meter is objectionable, and (3) in teaching, where this instrument is often unavailable on account of its cost. An adjourned Special General Meeting of the Society was then held.

ROYAL SOCIETY OF LITERATURE.

JUNE 27TH.—Dr. C. M. Ingleby, V.P., in the chair.—Mr. W. A. Barrett read a paper, "On the Etymons of Musical Terms," in which he pointed out that, as a knowledge of a language, through root-words, enables the philologist to trace and to recognise the original sources of language in common forms of speech, so it would be presumably possible to note the position in civilisation to which a nation had attained, by noting the musical instruments in common use. He then described the music of the ancient Hebrews, of the Greeks, and of the Latins, giving in detail the names and character of the several musical instruments known to them, and the relation of the same to those in more modern or present use. The general character of musical instruments and terms of mediæval times was then set forth, as well as those of later date, and a series of curious and interesting facts relating to the subject were brought forward. The influence of commerce with the East, with Spain, Italy, Germany, and France, upon the shape and names given to musical instruments, the peculiar changes in the words applied to theoretical music, and the probable process by which these changes were effected, were finally dwelt on.

PSYCHOLOGICAL SOCIETY.

JUNE 28TH.—Mr. Serjeant Cox, President, in the chair.—The Council stated that they had resolved to publish the Reports of Psychological Facts and Phenomena. The President read a paper "On the Psychology of Wit and Humour." A discussion followed.

CHEMICAL SOCIETY.

JUNE 21.—Dr. Gladstone in the chair.—The President announced the following grants from the Research Fund of the Society: Dr. Wright, £50; Mr. Neison, £25; Mr. C. Williams, £25; Mr. G. Harrow, £10. The following papers were read: "On Diamyl," by H. Grimshaw. This substance was prepared by the action of sodium on amyl bromide; it boils at 160°; a chloride and acetate were obtained and investigated. By the action of caustic potash on the acetate, two alcohols were formed, boiling at 202° and 212°. On oxidization, acids were formed. "On the Action at a High Temperature of certain Volatile Metallic Chlorides on certain Hydrocarbons," by Mr. W. Smith—*a*. The author investigates the action of antimony trichloride and tin tetrachloride on naphthalin, benzene, and toluene, when these substances are severally passed in the state of vapour through red-hot tubes. Benzene and tin tetrachloride gave a very large yield of diphenyl in one distillation. Toluene and antimony trichloride gave oils boiling at 270°—320°. Naphthalin and antimony trichloride: 77 grm. of the former yielded 24·2 grm. of yellow crystalline isodinaphthly; with tin tetrachloride, in addition to a large yield of isodinaphthyl, a reddish oil and a citron-yellow powder were obtained. *b.* Isodinaphthyl sulpho-acids and salts, with certain other derivatives; the α and β sulpho-acids were prepared; also an oxydinaphthyl, a nitro-substitution product and a cyanogen derivative. *c.* A new dinaphthyl. In the purification of crude isodinaphthyl by petroleum spirit, a fine red solution was obtained; from this, the author succeeded in separating three substances melting at 75°, 147°, and 253°; the latter is probably Lossen and Otto's polymeric dinaphthyl, the second is an isomeric dinaphthyl already obtained by Lossen, the first is a new isomeric dinaphthyl. "On the action of Alkaline Oxalates on the Earthy Carbonates, and of solutions of Alkaline Carbonates on the Earthy Oxalates," by Mr. W. Smith. The author having observed that when a solution of ammonium oxalate was brought into contact with chalk or powdered marble, an ammoniacal odour at once became apparent, has carefully measured the extent of this and similar reactions. "Note on Thallious Platinocyanide," by Messrs. R. J. Friswell and A. J. Greenaway. In 1871, one of the authors stated that the above substance was colourless, but that a compound of it with thallious carbonate crystallized in dark-red needles reflecting a green metallic lustre. Carstanjen having confused the two substances, and stated that thallious platinocyanide crystallized in blood-red needles, the authors have re-investigated the question, and fully confirmed the statements made in 1871. "On Crystallized Barium Silicate," by Mr. E. W. Prevost. Pisani having stated that this substance crystallizes in barium hydrate reagent bottles, the author has examined similar crystals, and finds that they consist of barium hydrate. "A Note on Anethol and its Homologues." by Mr. W. H. Perkin. Methylparoxyphenylacrylic acid, when boiled in a bulb tube furnishes a distillate, consisting of an oil with the formula, $C_9H_{10}O$, which on oxidation yields anisic acid. Methylparoxyphenylcrotonic acid yields anethol. Methylparoxyphenylangelic acid yields a similar substance. "Note on Persulphocyanic Acid," by Mr. R. W. Atkinson. The author discusses the constitution of the substance, and after investigating various silver and mercury compounds concludes that the formula proposed by Glutz is probably correct. "On the Oxidation Products of the Aloins," by Mr. A. Tilden. Barbaloin and socaloin, when oxidized by potassium bichromate and sulphuric acid, yield a yellowish substance which the author proposes to call aloxanthin, having the formula $C_{15}H_{10}O_6$. This substance, when treated with fuming nitric acid, yields a yellow nitro-acid, having the properties of aloetic acid.

HISTORICAL SOCIETY.

JULY 12TH.—Dr. B. W. Richardson in the chair.—Dr. Rodgers read a paper "On the Collegiate Church of Crail," in which he referred to the Chartulary of Crail, now being printed for the Grampian Club. The Collegiate Church was that in which John Knox, in June, 1559, first inculcated the doctrine of destroying the churches in order to the downfall of superstition. A paper by Mr. W. Kelly was read by the Secretary, "On the Visitations of the Plague at Leicester." This paper was founded upon materials derived from the borough records of Leicester. Dr. Heinemann next delivered an address on the history of Baron Stein, the Prussian statesman. In the discussion which followed, Dr. Zerffi, Mr. Moggridge, Mr. L. Gomme, Dr. J. Rae, and others, took part. In closing the business, the Chairman stated that the present session had been the most prosperous in the Society's career. They had enrolled fifty-one ordinary Members, among whom were several persons of eminence, while among the Honorary Members admitted were the Emperor and Empress of Brazil, the King of the Belgians, the King of Sweden and Norway, General Grant, ex-President of the United States, Count Von Beust, and Dr. and Mrs. Schliemann. The Society had also in the course of the session established communication and negotiated an exchange of *Transactions* with the principal Historical Societies of the Continent and America. Dr. Richardson added that he would accede to the Council's invitation by opening the session in November with a paper.

ASIATIC SOCIETY.

JUNE 18TH.—Sir E. Colebrooke, President, in the chair.—Messrs. Morris, Trotter, and Duff were elected as Resident Members, Messrs. Fleet, Codrington, and Vyse as Non-resident Members. Mr. Brandreth read a paper, "On the Non-Aryan Languages of India," his object being to give a brief account of these languages from more recent materials than those available to Prof. Max Müller, when, nearly thirty years ago, in a letter to the Chevalier Bunsen, "On the Turanian Languages," he summed up all that was then known. Mr. Brandreth described the non-Aryan languages of India as forming six groups, viz., Dravidian, Kolarian, Tibeto-Burman, Khasi, Tai, and Mon-Anam, and paid especial attention to the differences of grammar by which each group was distinguished. He, at the same time, exhibited a language map of India, coloured so as to show the positions of these groups. In the discussion that followed, Sir W. Elliot, Sir G. Campbell, and Messrs. W. W. Hunter, Lewin Bowring, and Forbes took part, the interest attaching to these languages and the necessity for further information about them being strongly insisted on.

SOCIETY OF ANTIQUARIES.

JUNE 21ST.—J. Evans, Esq., V.P., chair. Dr. C. S. Perceval communicated some Notes on two Rolls of the Head Courts of the Lord of Man and the Isles, A.D. 1417-1418, *temp.* Sir John Stanley. Dr. Josef Hampel, Custos-Adjunct of the National Museum of Budapest, communicated a paper, "On the Bronze Period of Hungry, as compared with that of Great Britain." The paper was accompanied by photographs of all the bronze objects in the National Museum. Mr. J. Evans also exhibited a large number of Hungarian bronzes from his own collection, which illustrated the various types referred to by Dr. Hampel in his paper.

METEOROLOGICAL SOCIETY.

JUNE 20TH.—Mr. H. S. Eaton, President, in the chair.—Messrs. H. Hearder and H. Law were elected fellows. The following papers were read: "On an Improvement in the Mechanism of Self-recording Meteorological Instruments," by the Rev. C. J. Taylor,—"On the Diurnal Variation of the Barometer at the Royal Observatory, Greenwich," by Mr. W. Ellis,—"On the Rainfall of Jamaica during the Seven Years 1870-76," by Messrs. Griffith and Co.,—and "Contributions to the Meteorology of Cannes," by Dr. W. Marcet. Mr. Marriott exhibited and described Bogen's hygrometer and new standard siphon barometer. The barometer possesses the following special features:—It is so constructed that it can easily be put together, and taken to pieces again. The long leg consists of a tube of the same diameter throughout, and is supplied with a glass stopper, which has a very fine bore passing through its centre, enabling one to fill the tube with mercury in one or two minutes, and to completely exhaust it of air in one or two minutes more. The open end of the long leg is ground air-tight to the short (curved) leg, and can be instantaneously put together or separated. The long tube alone is graduated, so as to have only one scale; but, by a peculiarly constructed screw of given length placed on the short tube, a precise and accurate reading can be easily obtained. The barometer is mounted on a peculiarly shaped stand, which has three adjusting screws, by means of which the perpendicularity of the instrument can be ensured.

QUEKETT MICROSCOPICAL.

JUNE 22ND.—H. Lee, Esq., President, in the chair.—Six new Members were elected. —Nominations for Officers and Committee were made, and Messrs. Dobson and Hainworth were elected Auditors. Mr. Ingpen read a paper "On the Camera Lucida," in the course of which he described the various forms of this and other contrivances for drawing the magnified images of objects under the microscope. The subject was illustrated by diagrams, and by the exhibition of numerous early and modern forms of the instrument lent for the occasion. A discussion followed as to the relative merits of the several plans mentioned, and Messrs. White, Hailes, and Dr. M. C. Cooke communicated the results of their experience in the matter. The further consideration of the subject was adjourned to the next meeting, at which it was arranged that a collection of apparatus, in further illlustration, should be exhibited.

ANTHROPOLOGICAL INSTITUTE.

JUNE 26TH.—J. Evans, Esq., President, in the chair.—Three new Members, one Honorary, and one Corresponding Member, were elected. Mr. Burt exhibited the prow of a New Zealand war canoe. supposed to have been that which met Capt. Cook on his second visit to that country. Mr. Atkinson exhibited a specimen of gold so-called Irish ring money. A paper by Mr. Mortimer, "On an Underground Structure near Langtoft, Yorkshire," was read. Mr. C. H. E. Carmichael read a paper, "On a Benedictine Missionary's Account of the Natives of Australia and Oceania," in which he summarized the principal points of anthropological interest in the "Memorie Storiche dell' Australia," by Mgr. Don Rudesindo Salvado, and illustrated the missionary's account by reference to the views expressed by Sopinard, Virchow, and other foreign writers. Mgr. Salvado maintains the unity of the Australian race and language, and upholds the possibility of raising the aborigines to a fairly high pitch of civilisation, urging their extreme quickness in learning to speak and write European languages. Two letters, written in Italian by native boys brought to Europe at about eleven years of age, were commented upon by Mr. Carmichael, who laid copies on the table, and promised further investigation of the questions raised in the discussion. The President, Mr. C. Walford, Sir J. Lubbock, and others, took part in the discussion.

ENTOMOLOGICAL SOCIETY.

JULY 4TH.—Prof. Westwood, President, in the chair.—Mr. J. W. Douglas exhibited a living specimen of *Cerambyx Heros* and a young larva of the same insect, bred from a log of wood imported from Bosnia. The President exhibited some cases built of small semi-transparent quartz-like particles. They were constructed by the larva of a trichopterous insect (Phryganea) inhabiting Southern Europe, and had been described in 1840 by Swainson as a shell of the genus Thelidomus. The President also exhibited a plant-bug (Capsidæ) found on the leaf of an orchis, which had become blistered all over from the attack of the insect.—Mr. J. Weir exhibited a female specimen of the Cicada of this country, which had been taken in his presence in the New Forest. The captor (Mr. Auld) stated that he had been attracted to the insect by hearing it stridulate. Mr. Douglas suggested that the male had been concealed near, and had produced the stridulating sound. Mr. S. Stevens exhibited two living specimens of *Tillus unifasciatus*, taken on a fence near Norwood. Mr. J. P. M. Weale, who had just returned from South Africa, exhibited a fine collection of insects from that country, and read a paper detailing the results of his observations and experiments on the rearing of *Papilio Merope* and other insects. The President brought under the notice of the Society the recent accounts of the appearance of the Colorado beetle in Canada and near Cologne.

GEOLOGICAL SOCIETY.

JUNE 20TH.—Prof. P. M. Duncan, President, in the chair.—Messrs. G. A. Gibson, H. P. Gurney, J. Higson, and F. Stevenson were elected Fellows. The following papers were read: "On a hitherto unnoticed Circumstance affecting the piling up of Volcanic Cones," by Mr. R. Mallet,—"On the Steppes of Southern Russia," by Mr. T. Belt,—"On the Glacial Period," by Mr. J. F. Campbell,—"On the Action of Coast-Ice on an Oscillating Area," by Prof. J. Milne,—"On Points of Similarity between Zeolitic and Siliceous Incrustations of Recent Formation by Thermal Springs and those observed in Amygdaloid and other altered Volcanic Rocks," by Prof. A. Daubrée,—"On the Cretaceous Dentaliadæ," by Mr. J. S. Gardner,—"On a Number of new Sections around the Estuary of the Dee which exhibit Phenomena having an important Bearing on the Origin of Boulder-clay and the Sequence of Glacial Events," by Mr. D. Mackintosh,—"Discovery of Silurian Beds in Teesdale," by Messrs. W. Gunn and C. T. Clough,—"On the Superficial Geology of British Columbia," by Mr. G. M. Dawson,—"The Exploration of the Ossiferous Deposit at Windy Knoll, Castleton, Derbyshire, by Mr. R. Pennington and Prof. W. B. Dawkins," by Prof. W. B. Dawkins,—"Description of the Fossil Organic Remains from Bendigo," by M. C. A. Zachariæ,—"Notes on some Recent Discoveries of Copper Ore in Nova Scotia," by Mr. E. Gilpin,—"Glacial Drift in the North-Eastern Carpathians," by Mr. R. L. Jack,—"On Terminal Curvature in the South-Western Counties," by Mr. W. A. E. Ussher,—"On the Chronological Classification of the Granitic Rocks of Ireland," by Mr. G. H. Kinahan,—and "On the Cambrian Rocks of South-East Ireland," by Mr. G. H. Kinahan.

ARCHÆOLOGICAL INSTITUTE.

JULY 6TH.—Lord Talbot de Malvhide, President, in the chair. Mr. J. H. Parker gaae an account of the most recent excavations in Rome, and also related what had been done in reference to the Roman Exploration Fund. He spoke of the discovery of three remarkable sarcophagi, made of tufa, which were found at a great depth. One of the skeletons in them had a gilt crown of decidedly Etruscan character. This, with some other interesting particulars was the subject of a discussion, in which Lord Talbot and Mr. O. Morgan took part. Prof. B. Lewis read a paper on Scandinavian antiquities, illustrating his remarks by an extensive series of drawings and engravings. Roman influence was proved to be powerful in Norway by the remains found in various places, though very few Roman coins have been met with. Byzantine, Anglo-Saxon,, and Anglo-Norman monuments yet exist, however, to demonstrate the variety in foreign prepossessions. Mr. G. T. Clark entered into the question of how the Romanesque style came to form part in the Scandinavian buildings, declaring that it could not have been *viâ* Normandy or England. Mr. C. C. Keyser read a memoir on certain mural paintings recently brought to light in the church of Kempley, in Gloucestershire, a secluded village seven miles from Ledbury. It was considered that these examples were of perfect Norman work, and unusually elaborate and fine. Messrs. S. Smith, J. G. Waller, and O. Morgan spoke warmly in praise of Mr. Keyser's labour in the investigation of these paintings, whilst Mr. Micklethwaite exhibited drawings of them. Earl Amherst drew the attention of the meeting to a Roman ring, highly characteristic of second-century work, which had been found in Sicily on the property granted to Lord Nelson as Duke of Bronté. Mr. Fortnum expressed his opinion that it belonged to the earlier years of the third century. A specimen of Norwich plate, in the shape of a silver chalice and paten, inscribed and dated 1568, bearing a Norwich assay mark, exhibited by Prof. Church, led to remarks by Mr. S. Smith on the subject; Mr. Cripps also stated some of the peculiarities he had found in a recent investigation of Norfolk chalices. These are generally seen with the name of the town and the date engraved, the weight also in some instances being added. Mr. O. Morgan produced an embroidered book containing the Creed and Ten Commandments worked in silk on both sides, curious, as showing a difference of text in the Seventh Commandment, which is expressed as "Thou shall not break wedlock," and proving to have been made between 1539 and 1611. This book is the property of Mr. Moggeridge, and is asserted to have belonged to Anne of Denmark, queen of James the First. The same gentlemen exhibited a fourteenth-century encaustic tile, with the arms of Henry, Duke of Lancaster; a drawing of a tesselated pavement, recently discovered at Caerleon, and an heraldic manuscription of the family of Sir William Morgan of Tredegar. Mrs. Mead lent for inspection a watch worn by a person of quality in the latter part of the seventeenth century. This timepiece was constructed at the transition period between the pendulum acting on gravity and the pendulum spring dependent on elasticity. It was made by Nat. Chamberlyne, who was admitted a member of the Clockmakers' Company of London in 1683, and is an instance of expensiveness of construction. A sword, presumed to have belonged to Sir Francis Drake, having his name, a coat of arms, and numerous devices illustrative of his services on the blade, came from Mr. A. Lewis. Fragments of ancient Indian pottery, stone arrowheads, and a "bark peeler" from mounds in Florida and Southern Utah, belonging to Miss Eden, were shown by Mr. R. H. S. Smith. A collection of coins was placed before the assemblege by Prof. B. Lewis, and drawings and photographs of Roman excavations by Mr. J. H. Parker.

VARLEY'S TELEPHONE.

FEW of the recent applications of science have attracted so much popular curiosity, and few, perhaps, have been the subject of such extravagant and erroneous statements, as the telephone. It has been said that the sound of a speaker's voice has been recognised after travelling through 500 miles of wire, that an orchestra can play to a dozen audiences a hundred miles apart, and so on. These are, indeed, only American reports, and perhaps it would be uncharitable to say that that accounts for their character. Yet the invention is indeed a most startling one—too remarkable, indeed, to be discredited by any amount of exaggeration.

That musical sounds should be transmitted by telegraph is, in fact, less remarkable than it first appears. To see this we have only to consider the conditions of the problem. Sound is, of course, only the result of air vibrations. If it is possible to produce at any place an exactly similar series of vibrations to that occurring at any other place, the same sounds will be heard at both spots. The vibrations must obviously be precisely similar—of the same rapidity, to give the tone or pitch; of the same amplitude, to give the intensity or volume of sound; and, more difficult to explain, they must also be such as to give the quality, which Helmholtz has shown to depend on the "harmonics" accompanying the primary tone. The first two conditions several telephones fulfil; the third is as yet unattained, and is perhaps unattainable.

It is not difficult to see that the vibrations of a tuning-fork, making and breaking an electrical circuit, will produce pulsations in the current which can, by their action on a magnet, alternately magnetised and demagnetised at each interruption and formation of the circuit, produce exactly similar vibrations in another tuning-fork, no matter how long the circuit and how distant the forks. This idea suggested itself to Philip Reuss in 1861, and resulted in the construction of the first telephone, In this the sending instrument consisted chiefly of a membrane stretched over a box in such a way that the membrane was put in vibration by the voice of any one speaking into the box. On the membrane was a piece of platinum, which, as it moved to and fro, formed and broke the electrical connexion in a properly arranged line of wire. By this line the electrical pulsations were transmitted to a coil of wire surrounding an iron bar, this having on the bar the curious effect of causing it slightly to expand and contract at each pulsation. These slight alterations in length, rapidly succeeding each other, produced a musical note, which corresponded in the number of vibrations with that sounded in the box, and was, therefore, identical with it. But though the note is the same, it is not of the same quality. The instrument cannot produce that; it merely, as has been said, sings with its own voice, which has been compared to a penny trumpet. The idea once started, inventors were not wanting to take it up and develop it. In America, Mr. E. Gray and Mr. Graham Bell have been most successful, and in this country Mr. Cromwell Varley, whose invention has been exhibited for some time past at the Queen's theatre. To describe the instrument minutely would be impossible without the aid of drawings. Still, perhaps, some account of its general action may be worth giving, inasmuch as it is certainly the first by which musical sounds have been conveyed by telegraph in this country.

Like all telegraphic apparatus, this telephone consists of two instruments, a sender and a receiver. Recently both these were at the Queen's Theatre, so that both could be examined, and the wire was laid across to the Canterbury Hall and back, a distance in all of some three miles. In the public performances, of course, the sending instrument will be at one place and the receiver at the other. Let us consider the receiver first, for it is in it that the greatest novelty of the instrument consists. The only thing visible to the audience is a large drumhead, or tambourine, inside which is stretched what appears to be a sheet of tissue paper. Nor is there very much more. Mr. Varley discovered the curious fact that if a pulsating electric current of "high tension" be sent into a "condenser," an arrangement of thin plates alternately of conducting and non-conducting materials, the plates will vibrate, and, if large enough and of proper construction, they will produce a musical note. The note thus formed is greatly magnified by the drumhead, and can be made to sound quite as loud as the ordinary note, say of a hautboy, which, indeed, it much resembles. It is understood that this condenser has some special features of construction, but to all appearances it differs little from the ordinary condensers of tinfoil and paraffined paper which are used in electrical operations. No satisfactory explanation of this curious phenomenon has yet been given, but of its existence there can be no doubt.

The sending instrument is much more complicated. A number of tuning forks, sufficient to enable a simple tune to be played by their means, are employed. Each of these has, mounted near its end, a small electro-magnet, worked by a battery, by which it is kept in constant vibration, precisely, to take a familiar instance, as the striker of an electric bell is kept going when the button is pressed down. The vibrations of the fork are then caused to make and break a second separate electric circuit passing through an "induction coil," by which the "low tension" electricity of the battery is transformed into the "high tension" electricity required to produce the vibrations of the condenser. All these forks are then kept vibrating simultaneously, producing, of course, a rather discordant hum; but the current from none of them passes into the condenser until, by the depression of a key, the circuit is completed between one of the forks and the condenser, when the note belonging to that fork is instantly sounded. A number of keys, one for each fork, are mounted on a key board, and they are manipulated just like pianoforte keys. The instrument at the Queen's has a compass of an octave and a half, from C below the staff to G above it, and there are consequently twelve forks with their attendant apparatus.

Of the music produced it is impossible to speak in very high terms. Some of the notes were good enough, but others were quite false, and the impression it gave was that the instrument was not properly adjusted and tuned. It was stated that its action is somewhat uncertain, and that it depends partly on atmospheric conditions. This is doubtless to be attributed to the use of high tension electricity, which, as is well known, is difficult to manage over long distances. It did not appear quite evident why a single coil placed near the condenser would not have acted equally well; but there are doubtless considerations of adjustment and the like which cannot be appreciated on a mere cursory inspection.

The whole apparatus has been put up in considerable haste and under considerable difficulties. The Post-office refused to lend a wire, and so it became necessary to erect a private one. This, involving as it did the getting the permission from the proprietors of houses in the route, was a troublesome undertaking; but it was successfully accomplished by the Gutta Percha and Telelgraph Works Company, of Cannon-street, who undertook the work. The span of a quarter of a mile across the Thames is an unusually long one, and seemed to present the greatest obstacle, but this was eventually crossed, and the line completed.

Should the present instrument prove all that is expected we are promised a speaking telephone; and it must be confessed that such an instrument would be of far greater utility, as well as of greater interest, than a telephonic organ such as that of Mr. Varley. The weak point of the American speaking telephone of Bell is the extreme lowness of its sounds. This is certainly not the case with Mr. Varley's apparatus. We shall look with interest for a combination of the two, for some apparatus in which the vibrations received by Bell's stretched membrane shall be given out by Varley's condenser. Such an arrangement, if the instruments can be cheaply worked and easily kept in order, would soon replace all the "A B C" instruments used for short distances and on private wires, even if it did not come into use for all our telegraphic communications. The instrument at present shown cannot transmit the sound of the voice, nor can it take up and reproduce the music played by an orchestra or even a single musical instrument. All it can do is to produce in its own voice whatever tune is played on it. That it should do so at a distance of several miles is strange enough, but more than this is expected from the perfect telephone, and more than this will certainly be accomplished before very long.

We are principally indebted to the *Times* for the above account of this invention; but we hope Mr. Varley will favour us with a more definitive account.

SULPHUR IN ICELAND.

The *Journal of Applied Science* gives the following account of the sulphur deposits of Ireland:—

Large deposits of sulphur exist in some districts, which at different times have been the object of commercial speculation. The sulphur mines at Krusavik in the south are at present worked for foreign account, but owing to their partial inaccessibility and difficulty of transport, without much success. The right of working at Myoatu, in the northern portion of the island, has recently been conceded by the Danish Government to an Englishman on a fifty years' lease. They were worked some years ago for a Copenhagen house, but were abandoned in 1851, since which time they have remained closed. Many causes contributed to this result, the chief of which, doubtless, were ignorance of the proper method of gaining the sulphur, the cost of transport on horseback to the seaboard, and the want of remunerative demand. Since then those conditions have changed, and there exists no reason why these mines should not be worked profitably. They extend over a large tract of country, and their position is most advantageous in the middle of a flat district, within an easy distance of Husavik, a convenient shipping port, and during the many years they have been closed the deposits must have very greatly accumulated, and should yield abundantly; indeed, so strong was this conviction in the minds of the natives, that they long opposed the leasing, except on very onerous terms, although quite unable themselves to work them. As these mines are now likely to remain in English hands for many years, a short account of their former history may be read with some interest. They are situated between 60° 20″ north latitude and the Arctic Sea, or, more definitely speaking, lying in the tract between Myoatu (Great Lake) on the east, and Iokulsa (Glacier River) on the west. The right of working them was bought from private owners by the Danish king, Frederick the Second, in 1563, and this right has ever since been in the possession of the Danish Crown. During the reign of this king considerable quantity of sulphur was extracted, amounting to as much as 400 tons annually. In the reign of his son and successor, Christian the Fourth, the produce appears to have fallen off, and his Majesty was unsuccessful in his endeavours to lease them to foreigners. To the falling off of their supply of sulphur in this reign, and the consequent scarcity of gunpowder, the Danes attributed their defeat by the Swedes in Holstein, in 1644. In 1665, we are informed that the Crown granted a concession for "digging sulphur" to a foreigner, who is stated to have exported large quantities up to the year 1676; since which date no special mention appears to have been made of them until the early part of the 18th century, when two foreigners, apparently Germans, acquired in 1724 the right of exporting sulphur from Iceland, of which they also shipped considerable quantities during the succeeding five years, when the death of the lessees put a stop to this commerce. After this date, and up to the present century, the Danish Government worked the mines on their own account, at times, it appears, with considerable profit, until 1806, when they were again leased to a foreigner, and subsequently they have at times been worked by private speculators up to 1851, since which date, as already mentioned, they have remained untouched. In 1840 they were visited by some scientific travellers, who calculated that these northern mines might easily yield an annual net profit of £1,000 or £1,200, but ten years later they were specially examined by a Danish mineralogist, who discredited this statement, and reported them to be less valuable, but in speaking of the Krusavik mines in the south, he says, these might easily be made to yield 200 tons annually, and yet they have always been considered inferior to the northern mines. A French geologist, Eugene Robert, who visited Iceland in 1835, and afterwards published a treatise on its geology, calls the attention of the Danes to the value of the Myoatu mines, and advises them not to lease them to the Englishmen (who were then applying for them), as the property might become of great consequence in the event of the sulphur mines of Sicily falling off, of which, he affirmed, symptoms had shown themselves. It will thus be seen that opinions are divided as to the productiveness and present richness of these mines, but so much is certain that they have for several centuries been worked at intervals with varying results, at times with considerable profit, and the history of the country and the experience of so many years points to the conclusion that, if properly worked, they would become a valuable property.

FRENCH WORKMEN AT THE EXPOSITION.

Ten thousand dollars have been appropriated by the Commissioners of the Paris Exposition of 1878 in aid of artisans who have meritorious objects to exhibit, constructed by their own hands, and who are working for their own account, but who are unable to defray the expense of exhibition from their own resources. The prefects of each of the 86 departments are to supervise the applications under this head.

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